Abundance and distribution of leatherback turtles along the U.S. West Coast

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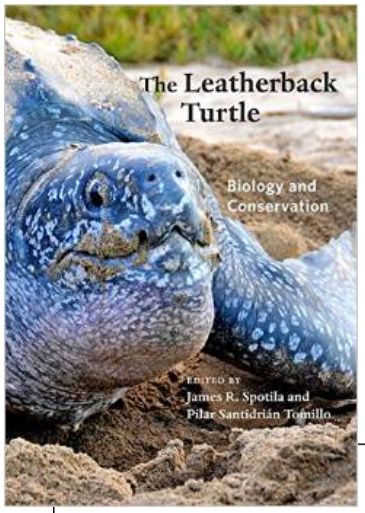
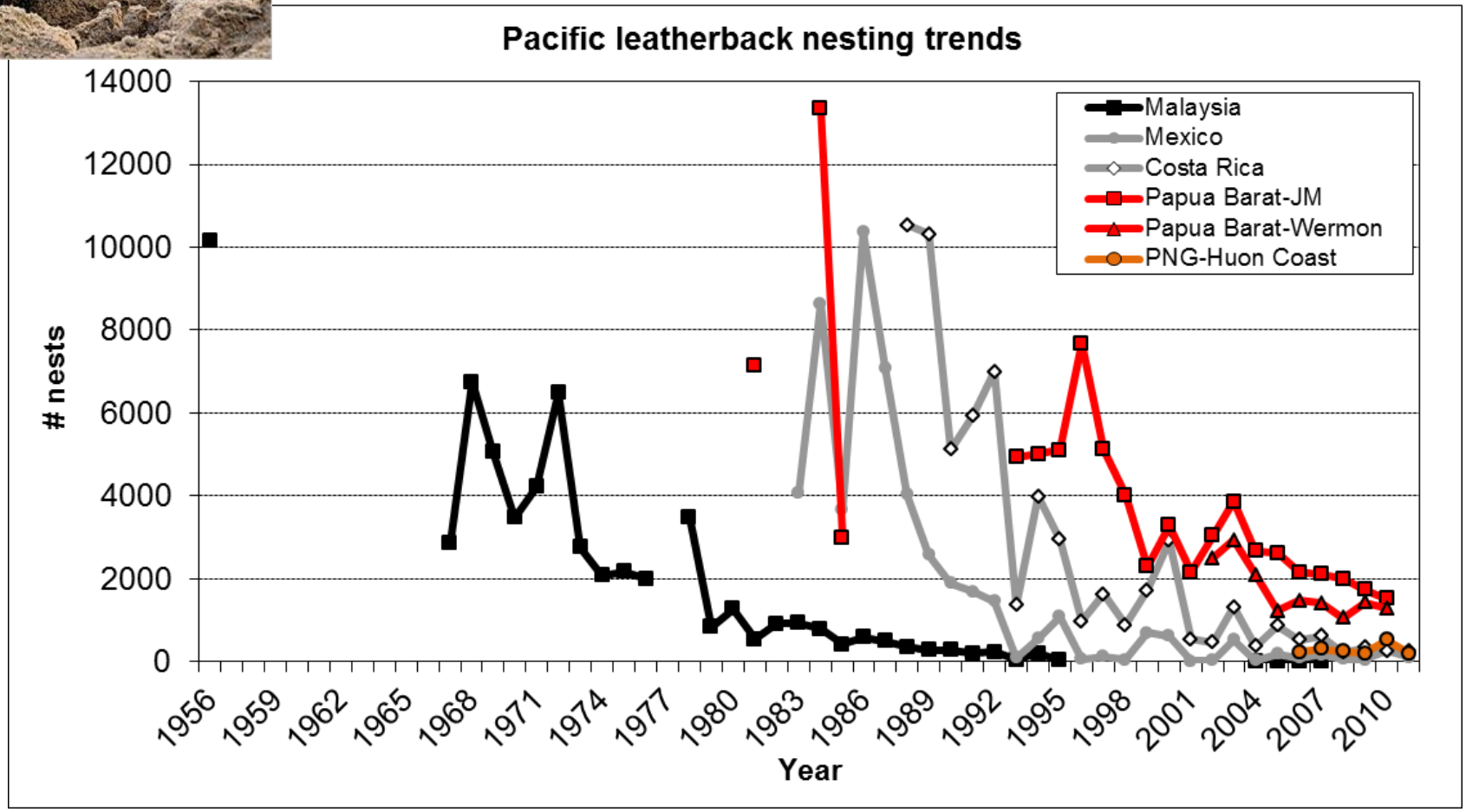
Outline

- Background
  - Origin and movements
- Abundance and trends
  - California, 1990-2003
  - California, 2004-2013 (preliminary)
  - Offshore habitat
  - Oregon/Washington, 2010-11
- Future Directions and Challenges
  - ‘Index areas’ at foraging grounds



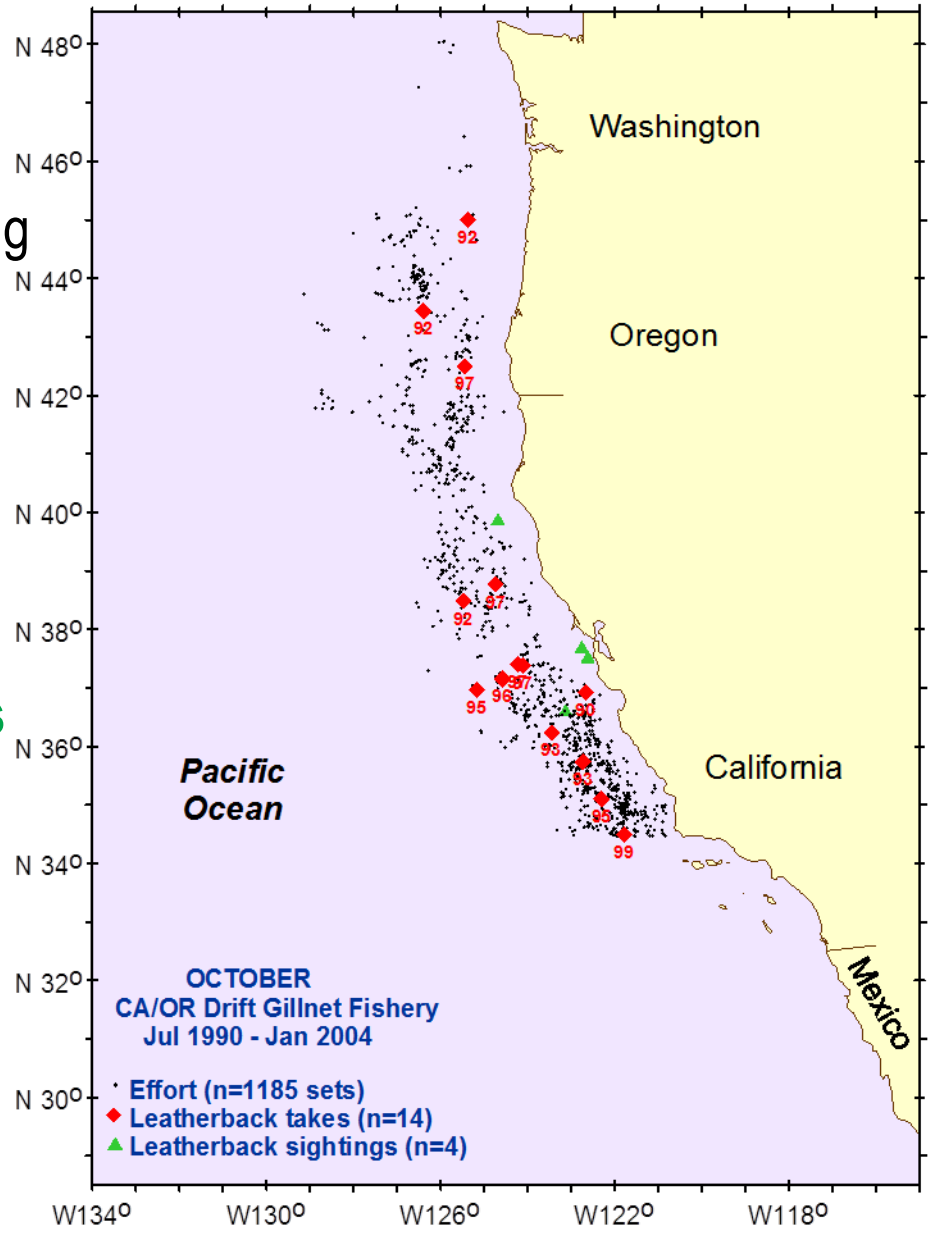
Pacific Population Trends

Benson et al. (In Press)



Background

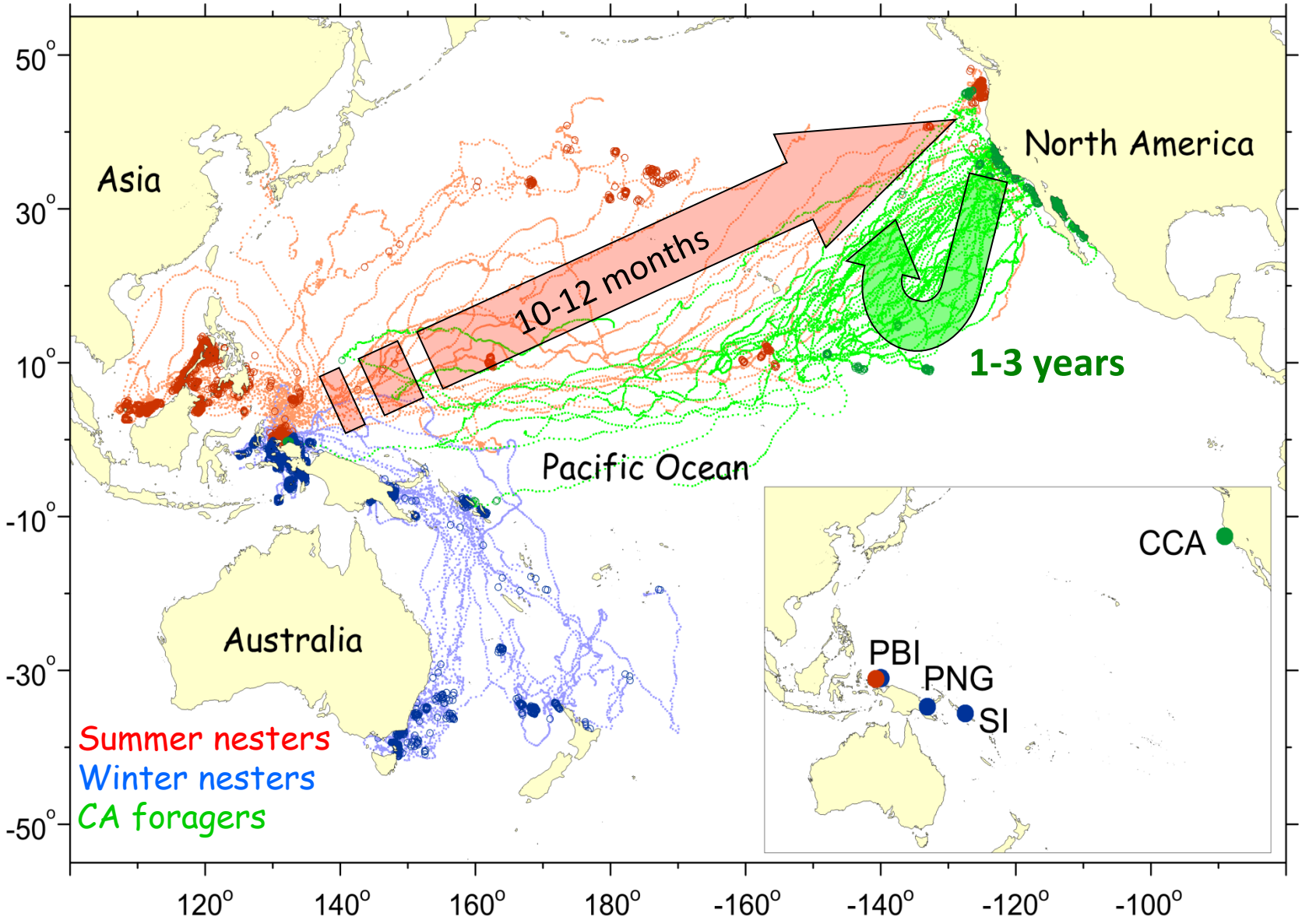
- Opportunistic sightings off California reported as early as 1905, with increasing recognition of their seasonal presence during 1980s and 1990s.
- **Drift gillnet takes** documented during 1990s
- Regular **observations of leatherbacks during aerial harbor porpoise surveys** led to systematic recording of sightings beginning in 1990.
- Nothing known about origin, abundance, or migration patterns of these leatherbacks



Multi-disciplinary approach

- Aerial surveys
- Satellite telemetry
- Genetics
- Oceanographic sampling
- Prey sampling
- Stable Isotope

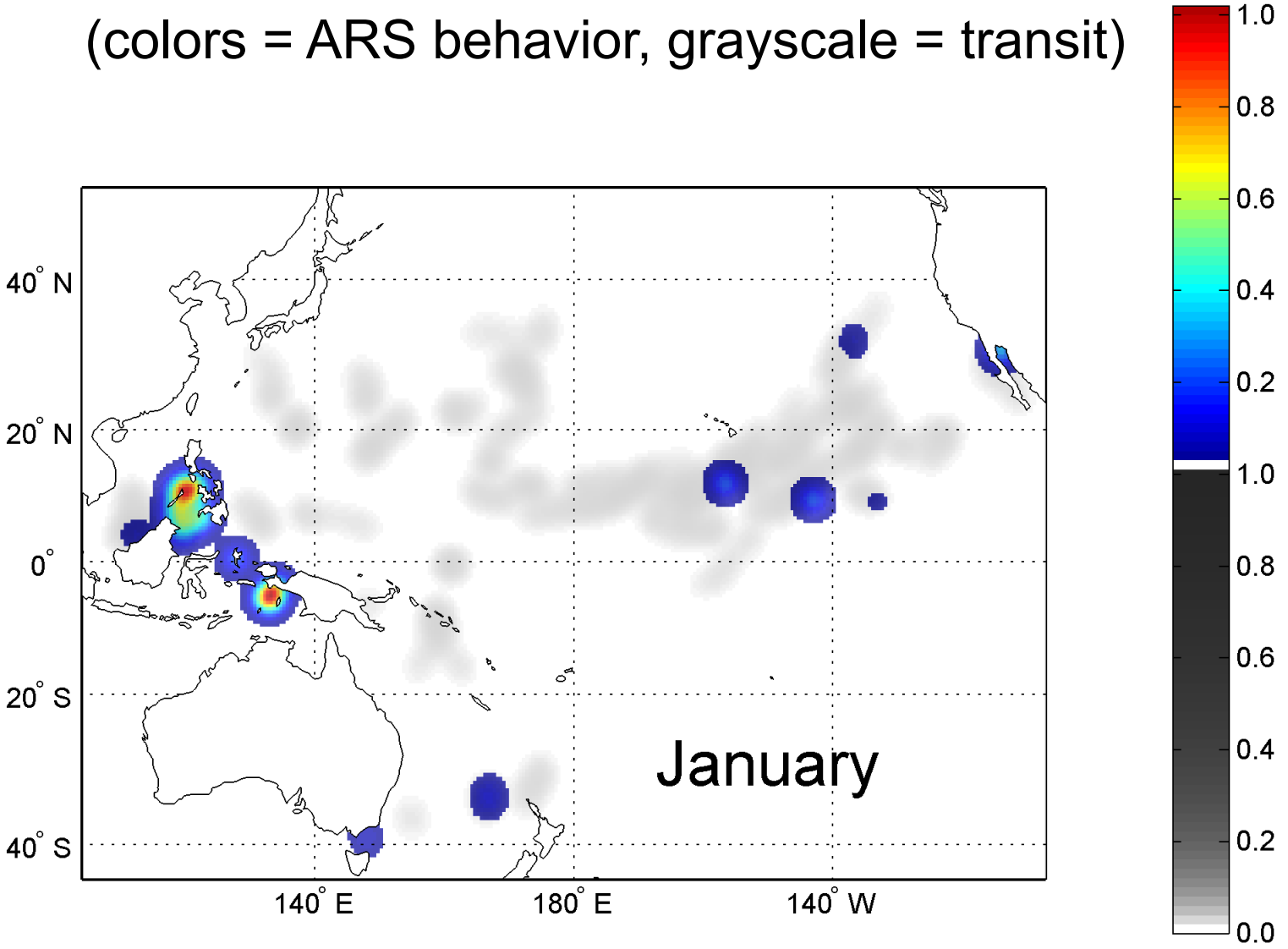
‘U.S. West Coast’ leatherbacks



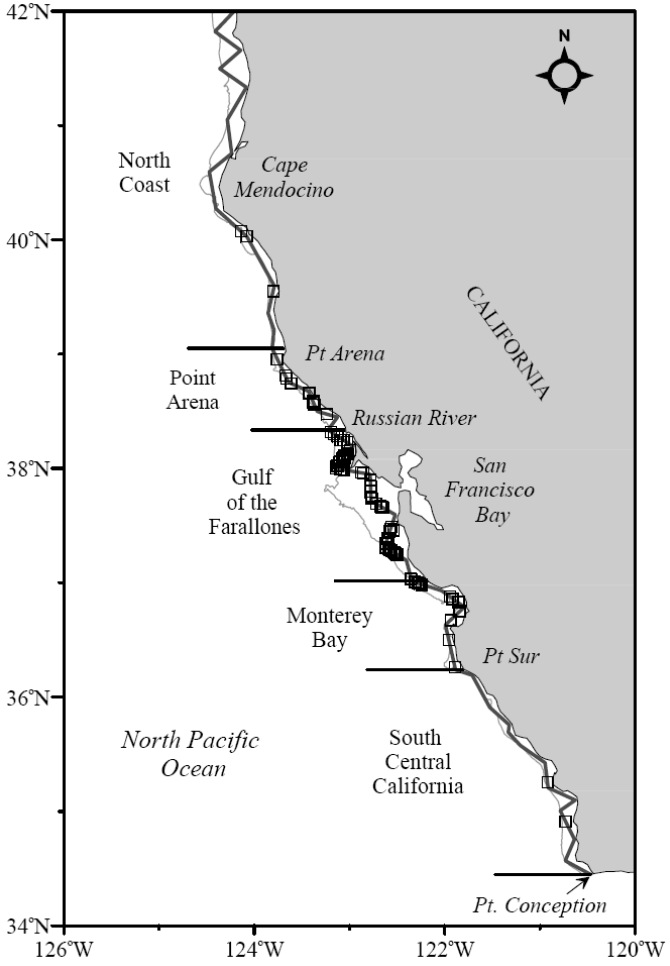
Benson et al. 2011, Ecosphere 2:84

Seasonal areas of high use by western Pacific leatherbacks

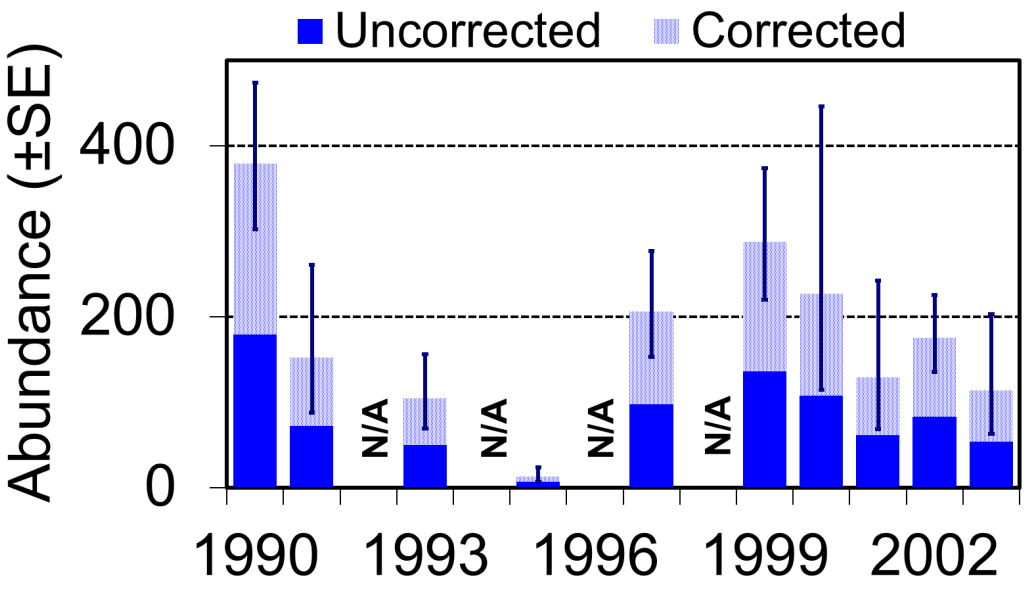
(colors = ARS behavior, grayscale = transit)



California leatherback abundance, 1990-2003
(From harbor porpoise aerial surveys)

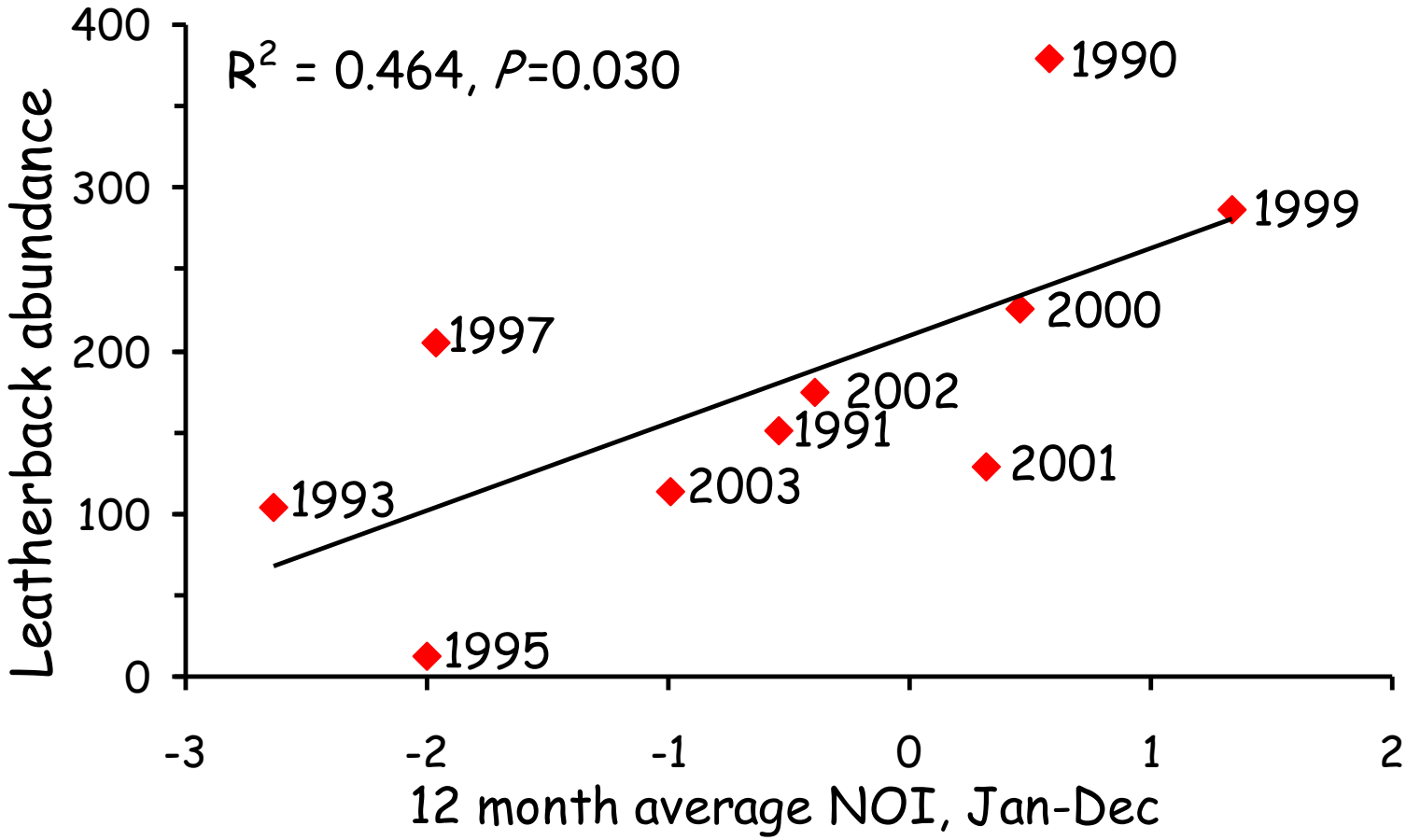


- Line-transect abundance estimates
- Includes correction, *g(0)*, for proportion of time available to be seen (from dive data)



Benson et al. 2007, Fishery Bulletin 105:337-347

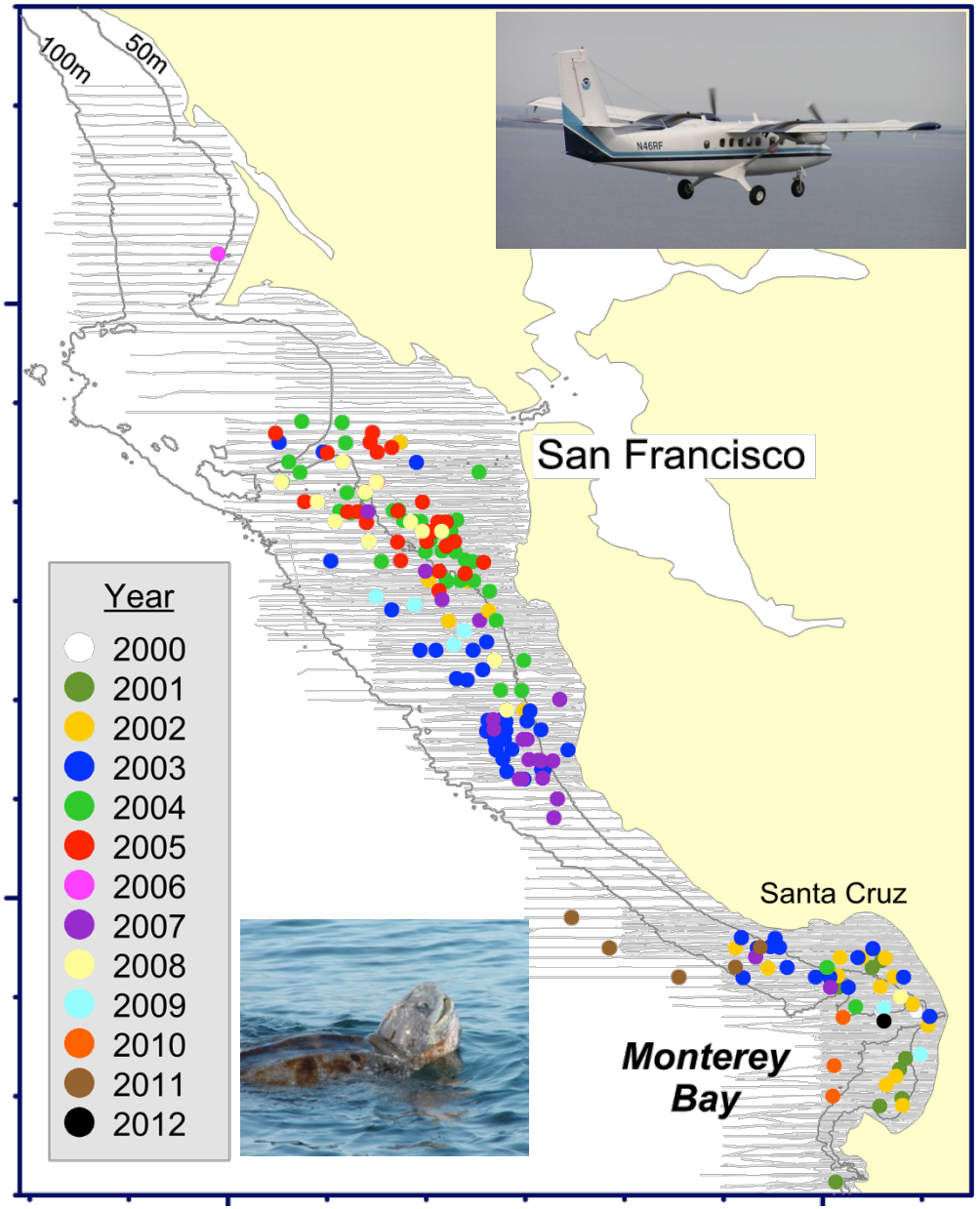
California leatherback abundance, 1990-2003 relative to the Northern Oscillation Index (NOI)



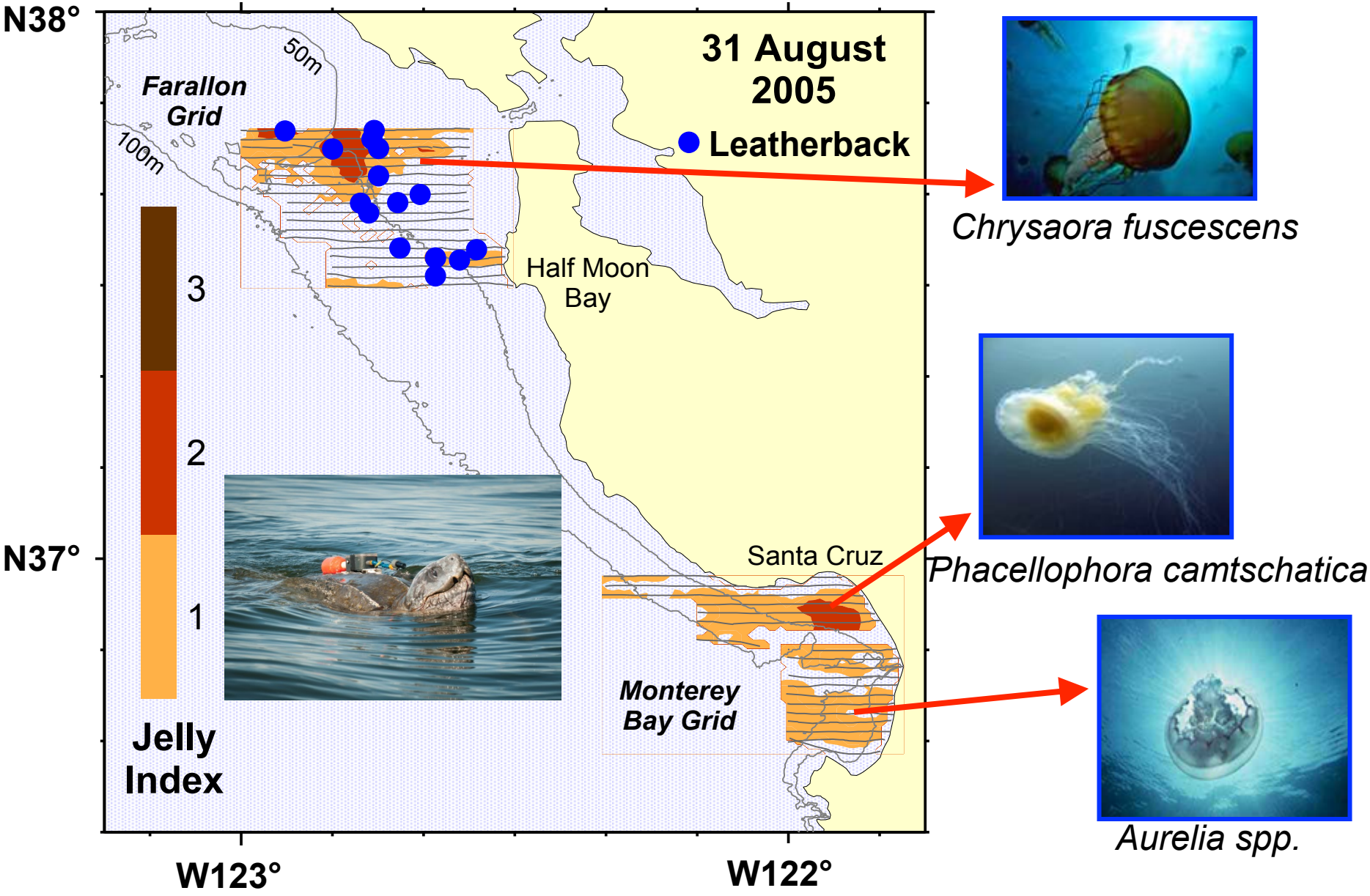
Benson et al. 2007, Fishery Bulletin 105:337-347

Leatherback distribution along central California coast, late summer/fall 2000-2012

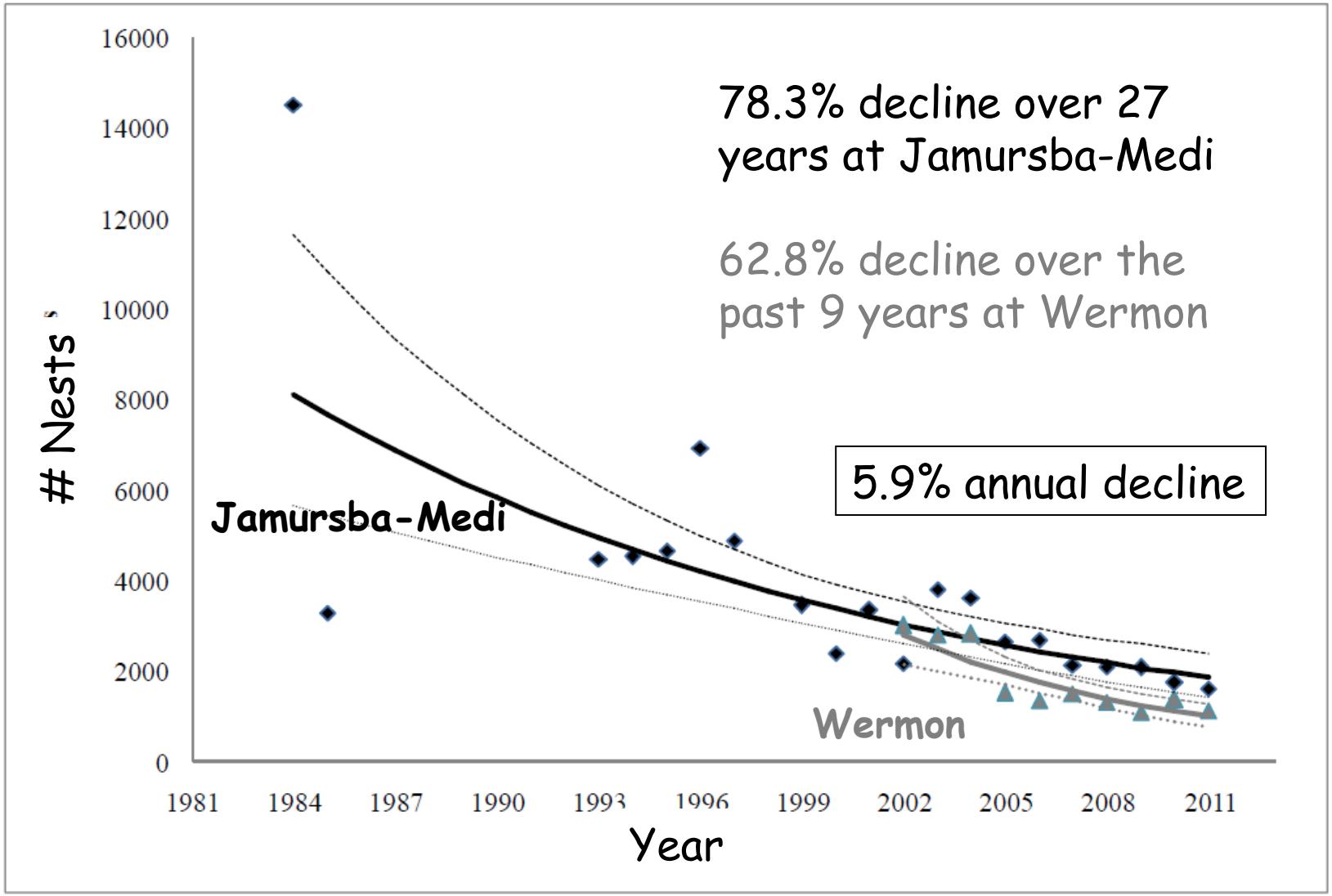
- Spatial variation of leatherback aggregations between years
- 14-16°C water temperature
- Centered along 50-m isobath; retention areas / upwelling shadows



Studying prey selection by leatherbacks off central California

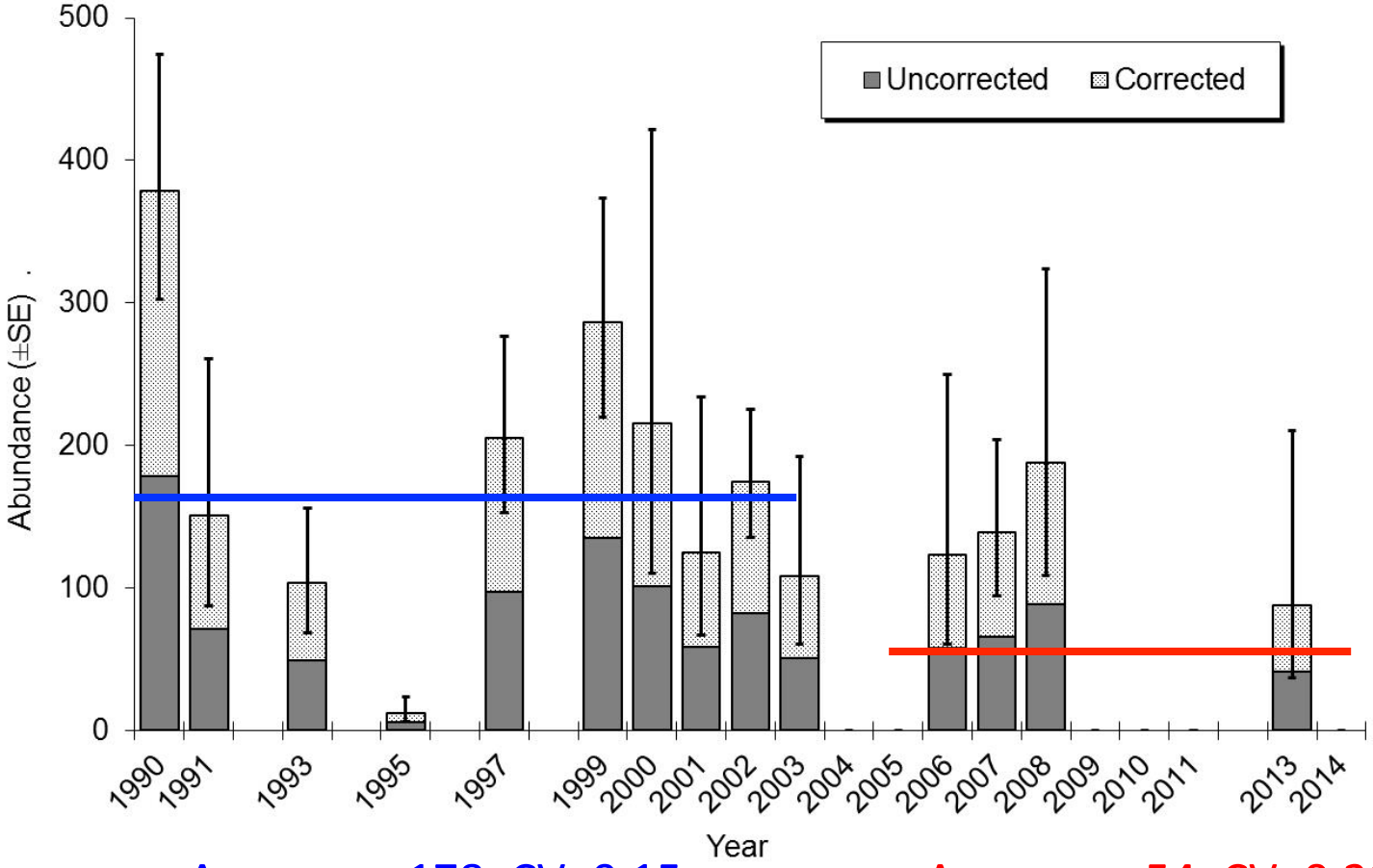


Trends at primary nesting beach complex: North Bird's Head Peninsula (Papua Barat, Indonesia)



Tapilatu et al. 2013, Ecosphere 4:25

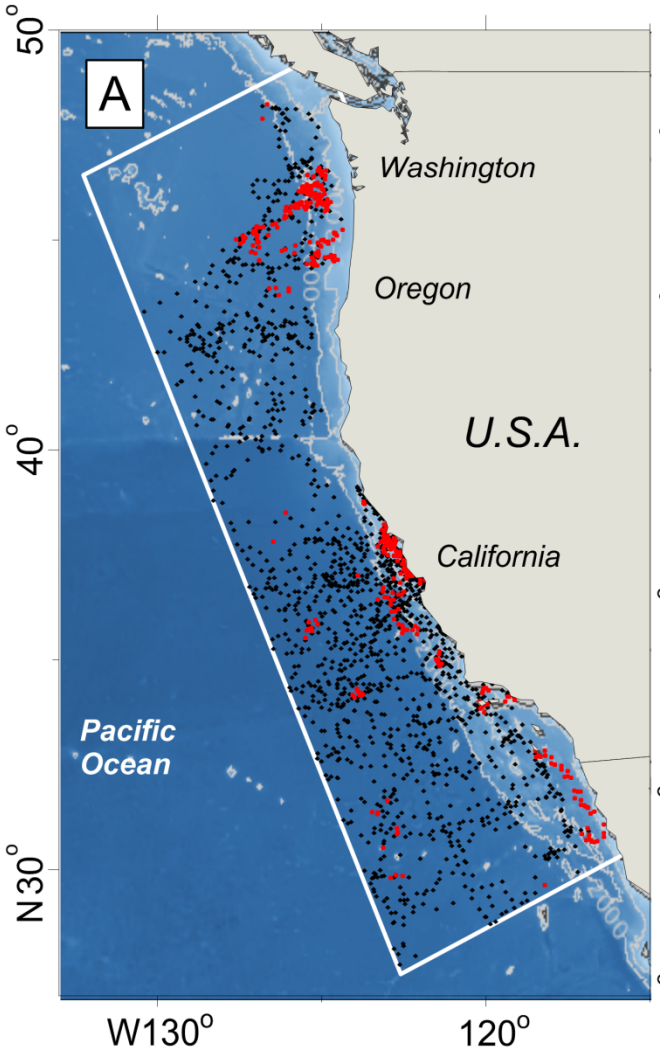
Corresponding decline at California neritic foraging areas? (preliminary estimates for 2004-2014 . . . work in progress)



Average = 178, CV=0.15
95% CI : 134-237
(Benson et al. 2007)

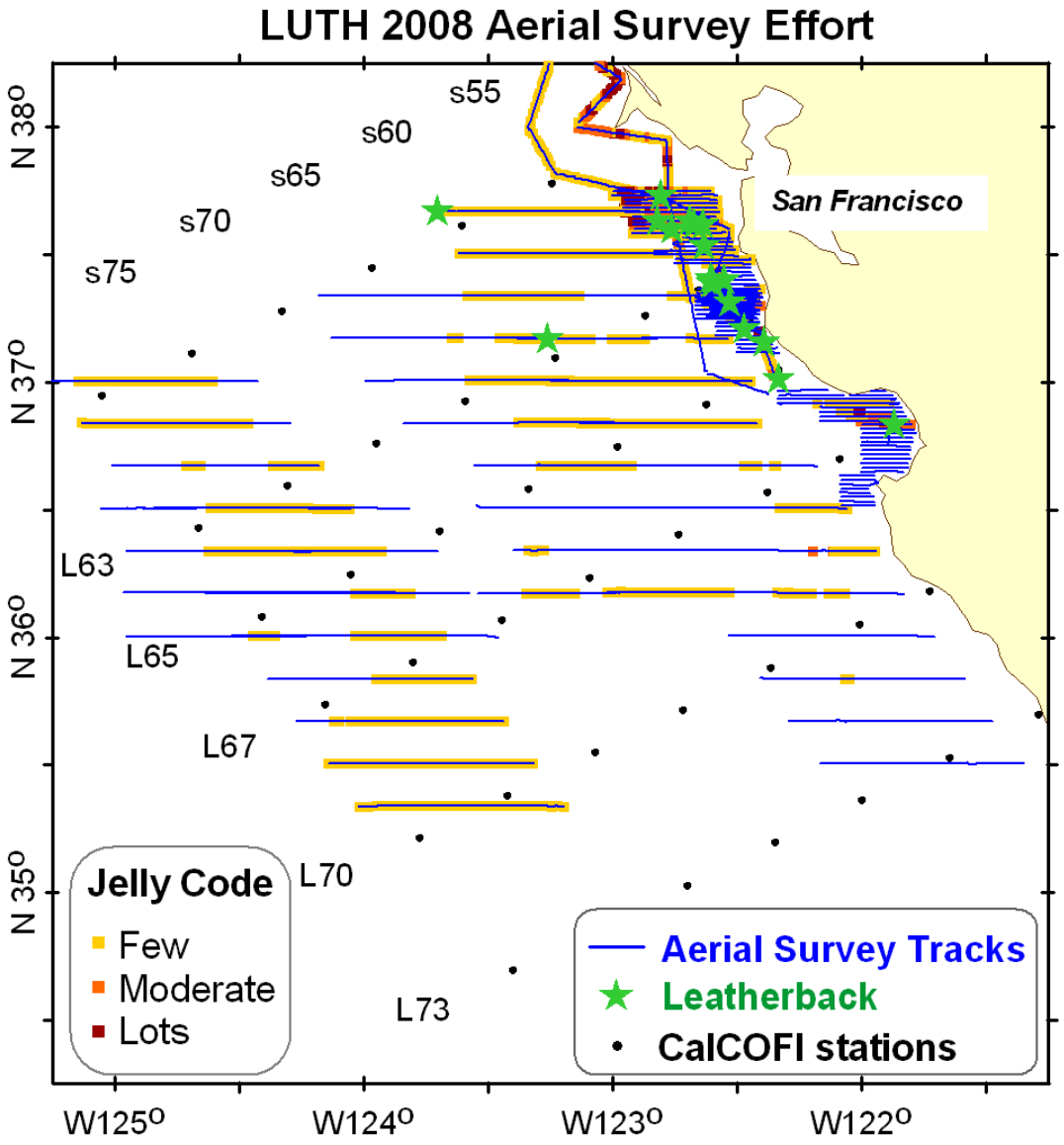
Average = 54, CV=0.29
95% CI : 25-77

Other Areas of Leatherback Foraging (from telemetry)



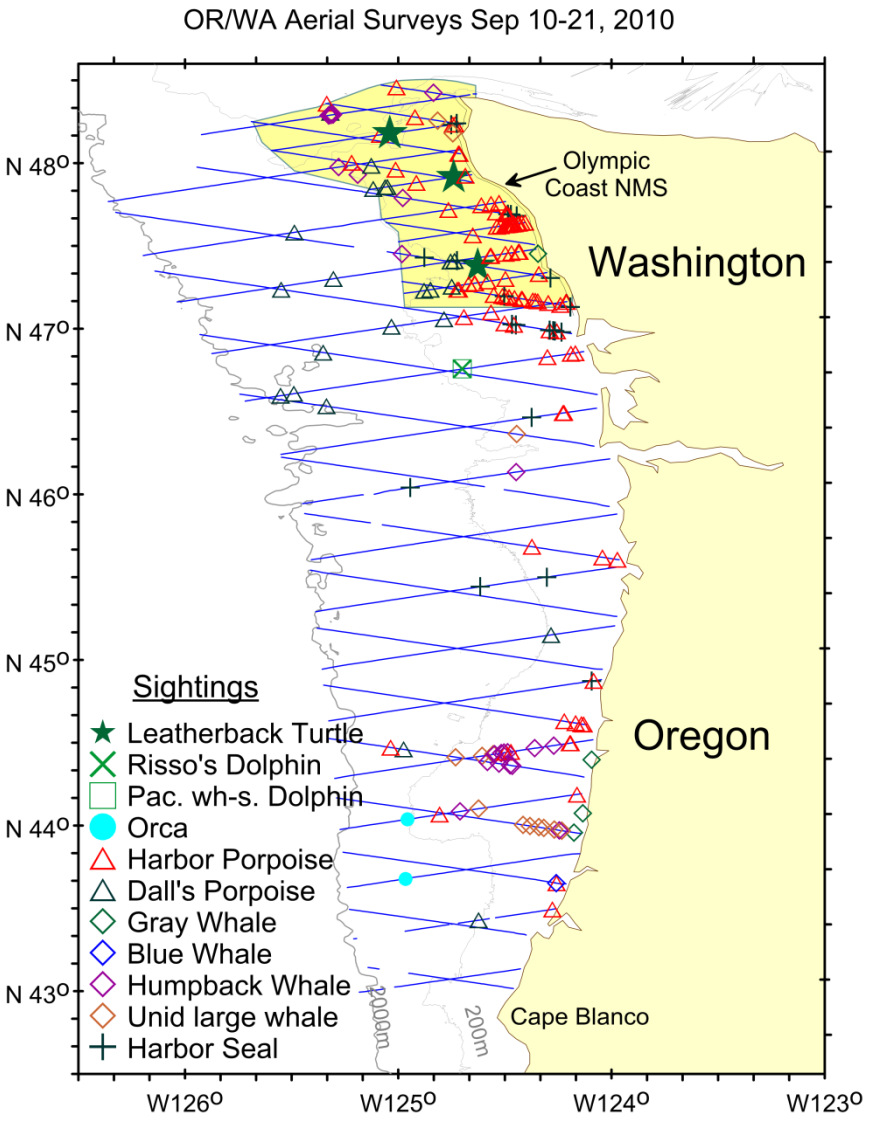
- Oregon/Washington
- Offshore central California

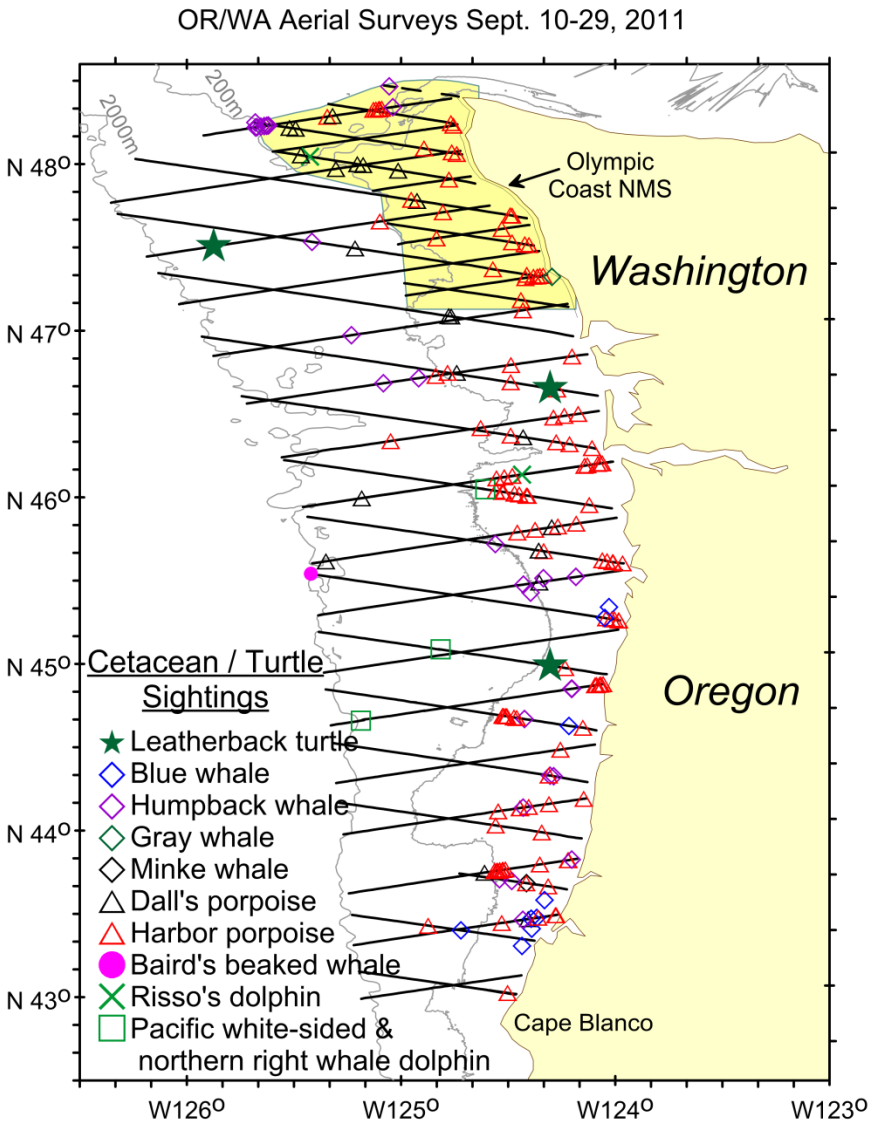
LUTH 2008: Leatherback Use of Temperate Habitat along the Central California Coast



- 24 August – 22 September 2008
- An ecosystem assessment in offshore waters of central California, including traditional swordfish fishing grounds
- Identify leatherback foraging areas via shipboard oceanographic and prey sampling, aerial surveys, and satellite telemetry
- Determine how areas used by leatherbacks may overlap with swordfish habitat

Leatherback Surveys off Oregon and Washington





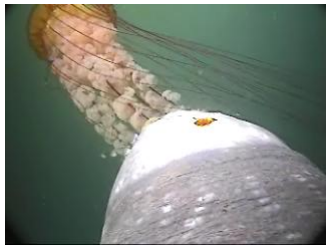
The Challenge:

Monitoring abundance of a species that has complex migration patterns and is declining in abundance.

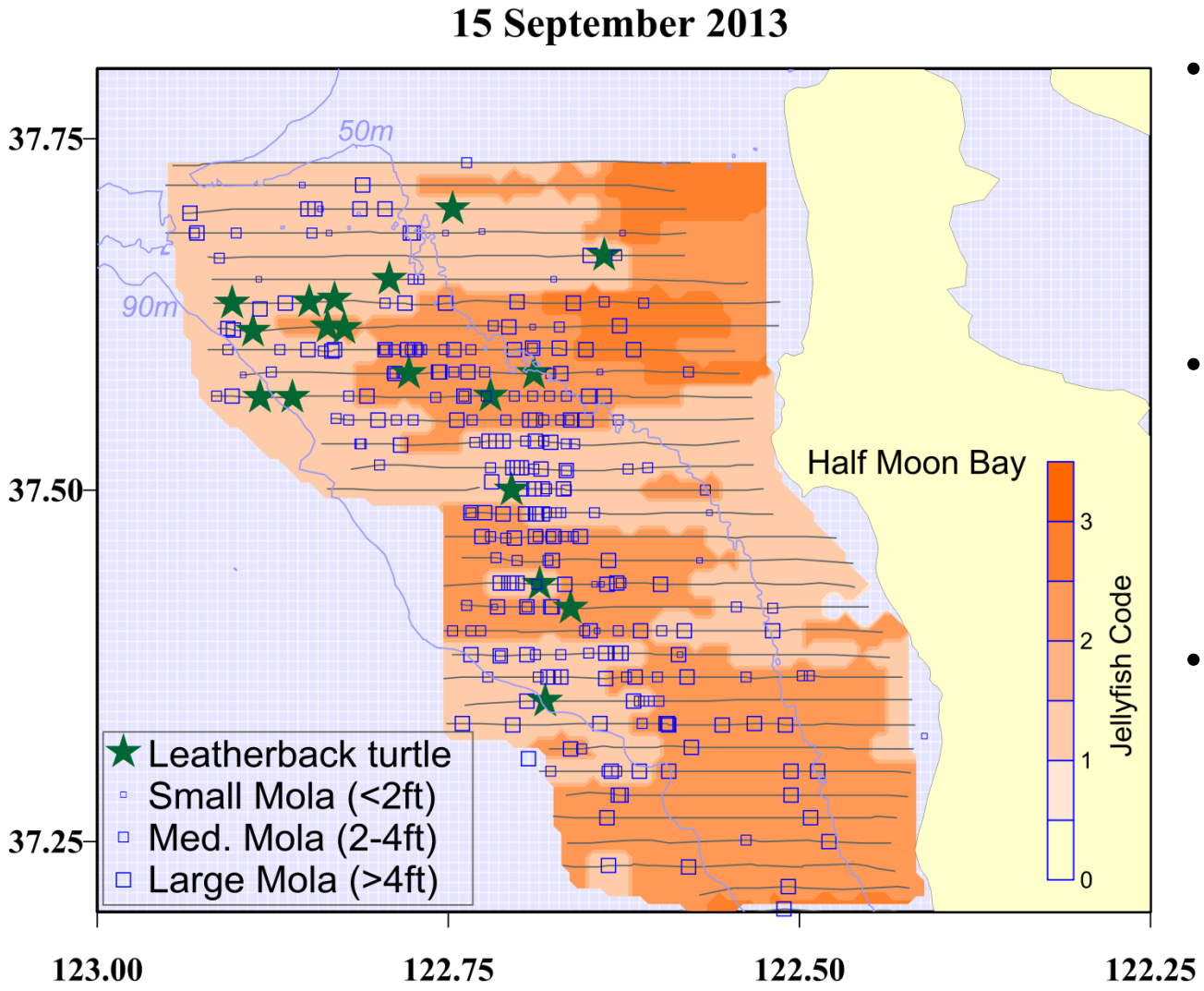
The entire California Current Ecosystem is too large, and there are too few turtles.

Therefore, we need to identify where and when leatherbacks are present annually, and optimize sampling in those areas.

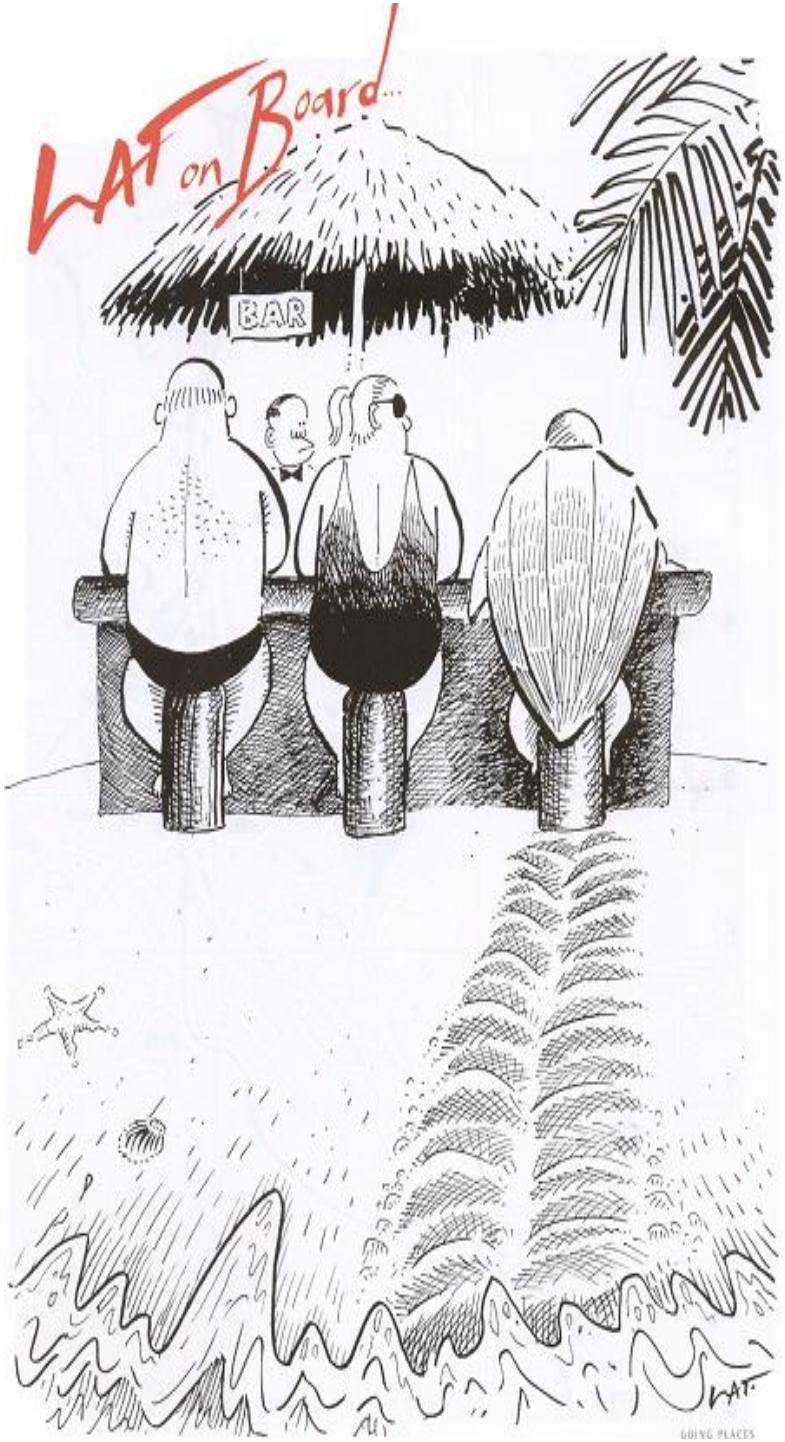
**65298 seconds = 18.14 hours*



Future Directions: Surveys of 'index areas' where suitable habitat is identified



- Fine-scale surveys have mainly supported capture/sampling operations
- May offer a way to optimize effort in areas of leatherback occurrence
- Plan to combine data from harbor porpoise surveys and fine-scale surveys in a Bayesian framework



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